

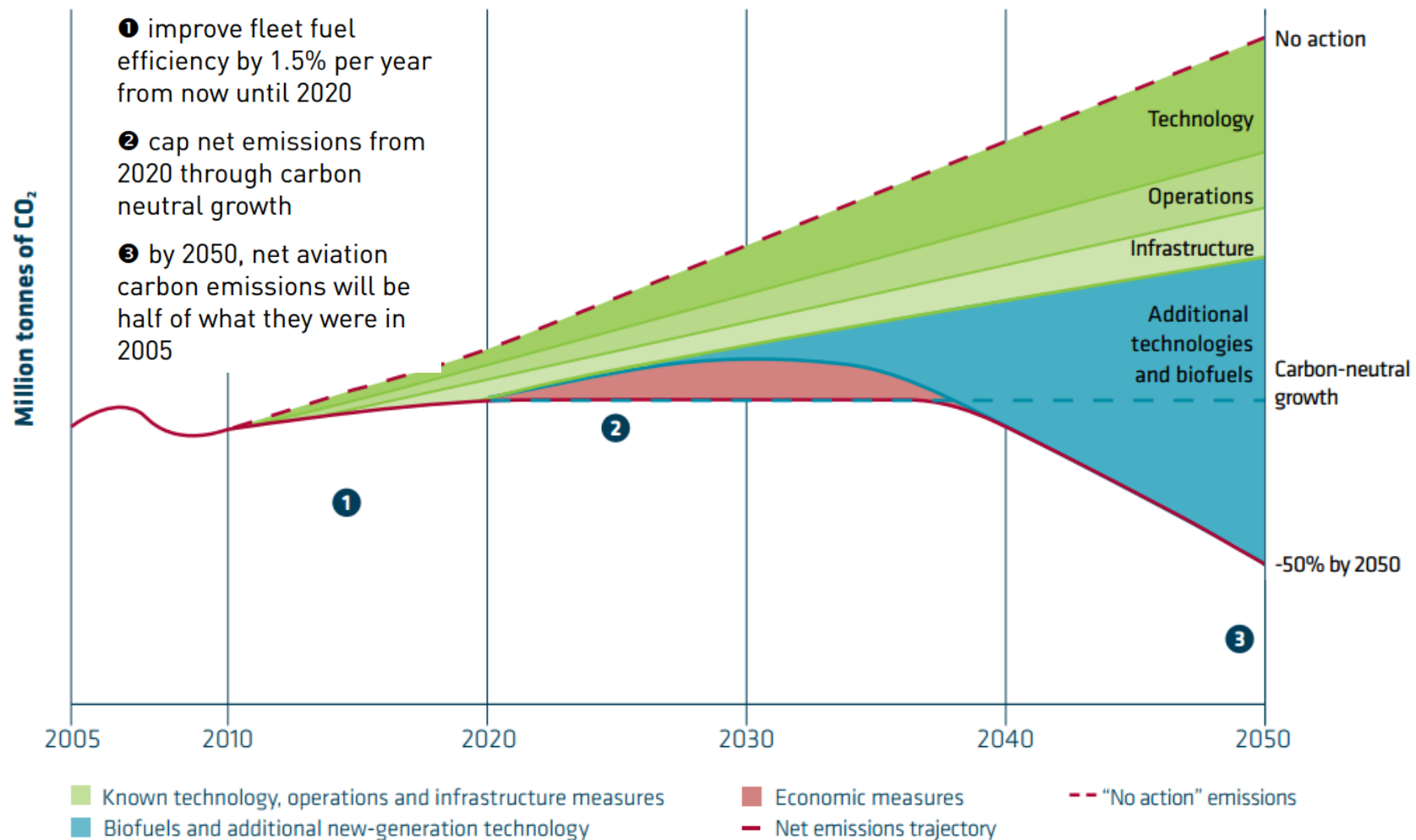
# Biojet: A Canadian Opportunity

---



Green Aviation  
Research & Development  
Network  
Groupe de Recherche et Développement  
en Avionnement

# Context: Significant Global Commitments



- GARDN is part of the Canadian program “Business-Led Network of Centres of Excellence” (BL-NCE).
  - GARDN I (2009-2014)
  - GARDN II (2014-2019)
- Objective: Increase competitiveness of Canada’s aerospace industry through the reduction of its environmental footprint
- Two-pillar strategy:
  - Evaluating, Funding and Monitoring precompetitive collaborative industrial R&D projects (TRL 3 to 6)
  - Focal point of reflection on environmental aviation in Canada, Worldwide



# Research Themes

## QUIET

- Aircraft noise (airframe, landing gear)
- Engine noise (propeller, turbomachinery)
- Cabin noise

## CLEAN

- Aircraft design and optimization to reduce fuel burn and climate change
- Advanced engine and combustor concepts to reduce fuel burn, Nox and particulate matter
- Alternative fuels
- Optimized navigation and avionics

## SUSTAINABLE

- Product end-of-life
- Green manufacturing and MRO
- Materials of concern
- Recycling / Reuse of parts



# Members, Contributors and Participants



# Canada's Biojet Supply Chain Initiative: Enabling 2020 Carbon Neutral Growth



# Project Intent:

***Demonstrate the operational feasibility*** of biojet fuels in the domestic jet fuel supply system using existing delivery infrastructure (e.g., co-mingled airport fuel system).

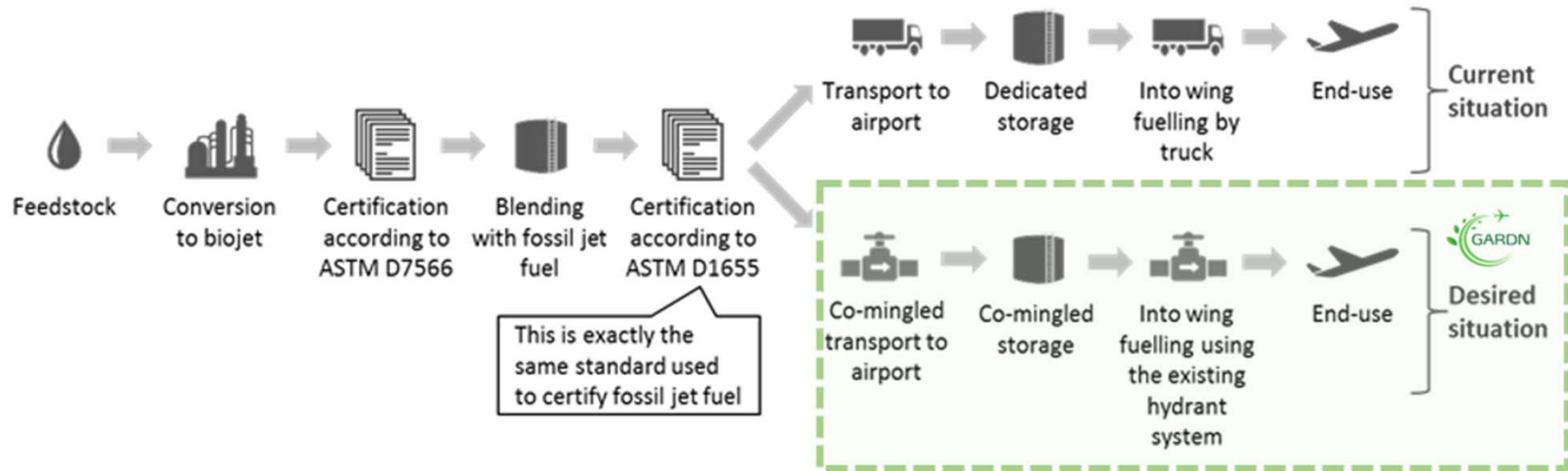
***Validate CDN biojet supply chain elements*** (e.g., quantitative feedstock availability, sustainability certification, biojet integration in the jet fuel supply system, quantify regulatory/fiscal options).

***Generate hands-on experience*** with biojet integration to develop best practices in a Canadian context.

***Catalyze the development*** of the domestic biojet sector by using HEFA biojet as an enabling mechanism to create market access, drive research, development, and commercialization of advanced biofuel feedstocks and conversion technologies beyond the 2020 timeframe.

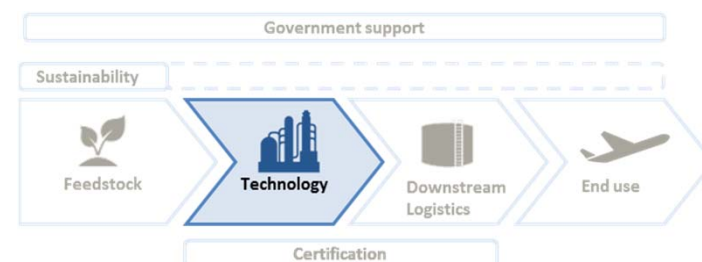






# The operational future enabled by CBSCI:





# There are mature conversion technologies, more pathways are being developed



Pathway*	ASTM	Description	Target feedstock
Fischer-Tropsch (FT)		Converts any carbon-rich material (e.g. biomass) into sugars, which is then catalytically converted to jet	All biomass & MSW
Hydroprocessed Esters and Fatty Acids (HEFA)		Converts oil to jet via deoxygenation with hydrogen and cracking	Oils and fats
Direct Sugar to Hydrocarbon (DSHC)		Ferments plant sugars and starches to hydrocarbons which are subsequently thermochemically upgraded to jet fuel	Sugars (can be cellulosic)
Alcohol to Jet (ATJ)		Uses alcohols derived from sugars, cellulosics, or syngas and converts them to jet via dehydration, oligomerization, and hydrogenation	All biomass, waste gasses & MSW
Hydrotreated Depolymerized Cellulosic Jet (HDCJ)		Converts any carbon-rich material into a bio-crude oil via thermochemical depolymerization which can then be upgraded to jet	All biomass & MSW

\*This table comprises only those pathways that are expected to be approved before 2016

# GREENAIR

ONLINE.COM

INDEPENDENT REPORTING ON AVIATION AND THE ENVIRONMENT

ARCHIVES

EVENTS

DIRECTORY

GLOSSARY

ABOUT US

ADVERTISING



Delivering airline  
environmental  
performance

## WELCOME!

Login  
Logout  
Register For Free Subscription  
To e-Newsletter  
Edit My Profile

## ABOUT THIS SITE

Front Page

## Canadian jet biofuel initiative selects Montreal-Trudeau for co-mingled fuel supply project

Wed 1 June 2016 – Montréal-Trudeau Airport has been chosen by Canada's Biojet Supply Chain Initiative (CBSCI) for a project to supply aircraft with sustainable aviation biofuel from a shared fuel system. The three-year collaboration involving 14 stakeholder organisations, including Air Canada, is aiming to introduce 400,000 litres of biojet. Previous Air Canada biofuel flights used biojet that was segregated from regular jet fuel and loaded separately into an aircraft by a tanker but CBSCI is looking to develop a more efficient operational framework that will make use of a multi-user, co-mingled airport fuel supply system. The first of its kind in the country, the objective of the CBSCI project is to create a sustainable Canadian supply chain of biojet using renewable feedstocks.



# BIOMASS

MAGAZINE

processbarron

processbarron.com/biomass

PELLETS | POWER | THERMAL | BIOGAS | ADVANCED BIOFUELS | CHEMICALS

✉ 📄 f t g+ in More

## Air Canada partners in biojet supply chain initiative

By Air Canada | April 07, 2016

Air Canada recently announced it will participate in Canada's Biojet Supply Chain Initiative, a three-year collaborative project with 14 stakeholder organizations to introduce 400,000 litres of sustainable aviation biofuel



CNW  
a CISION company

NEWS RELEASES

FINANCIALS

WEBCASTS

See more news releases in [Airlines & Aviation](#) | [Alternative Energies](#) | [Passenger Aviation](#) | [Environmental Issues](#) | [Joint Ventures](#)

## Air Canada Partners in Biojet Supply Chain Initiative to Introduce Sustainable Aviation Biofuel at Canadian Airport

Share g+ t in Pin it English

MONTREAL, April 5, 2016 /CNW Telbec/ - Air Canada today announced it will participate in Canada's Biojet Supply Chain Initiative (CBSCI), a three-year collaborative project with 14 stakeholder organizations to introduce 400,000 litres of sustainable aviation biofuel

Sections

thestar.com



Business

## Air Canada backs effort to build homegrown 'green' jet fuel infrastructure

Ambitious project aims to eventually tap into existing fuel-delivery systems at Canadian airports.



CleanTechnica is the #1 cleantech-focused news & analysis site in the world. Subscribe now. The future is now.

About

Electric Car Reviews

Exclusives

Power

Transport

Surprise

## Canada Moves Closer To Mass Adoption Of Biojet

May 24th, 2016 by Roy L. Hales



Originally published on [the ECOreport](#).

Air Canada's announcement that it will use 400,000 liters of sustainable aviation biofuel (biojet) at Montréal-Trudeau Airport is much more significant than the amount of fuel being used.



Cleantech

Sponsored

# Green POS

Click here to sponsor Clear your brand to millions of readers in one month.

Advertisement

SSEN

Organization Profile

# Rationale for biojet development in Canada

Canada is uniquely positioned to become a leader in the field of biojet fuel: it has a rich feedstock base, an airline community ready to use biojet fuel, and the expertise to develop bio-refineries, among other advantages



Increased economic development



Feedstock availability

AIR CANADA 

Interested airline community

WESTJET 

porter



Capacity to implement policy



Synergies with existing industries



R&D expertise

Year	Jet Demand (BL)	Jet Growth (BL)	Biojet Needed for CNG (BL) (40%)	Biojet % (40%)	Biojet Needed for CNG (BL) (100%)	Biojet % (100%)
2020	7.55	0.11	0.05	0.7%	0.14	1.8%
2021	7.67	0.23	0.11	1.5%	0.28	3.7%
2022	7.78	0.35	0.17	2.2%	0.43	5.5%
2023	7.90	0.46	0.23	2.9%	0.57	7.2%
2024	8.02	0.58	0.29	3.6%	0.72	8.9%
2025	8.14	0.70	0.35	4.3%	0.86	10.6%
2026	8.24	0.80	0.40	4.8%	0.99	12.1%
2027	8.35	0.91	0.45	5.4%	1.13	13.5%
2028	8.47	1.03	0.51	6.0%	1.27	15.0%
2029	8.58	1.14	0.56	6.6%	1.41	16.4%
2030	8.69	1.25	0.62	7.1%	1.55	17.8%
2031	8.80	1.37	0.68	7.7%	1.69	19.2%
2032	8.93	1.49	0.74	8.2%	1.84	20.6%
2033	9.05	1.61	0.80	8.8%	1.99	22.0%
2034	9.18	1.74	0.86	9.4%	2.15	23.4%
2035	9.30	1.87	0.92	9.9%	2.31	24.8%

# Five Components for Establishing a Renewable Aviation Fuel Industry

